

**UNITED STATES PATENT APPLICATION**

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**METHOD FOR ASSIGNING A DATA CHANNEL TO MULTIPLE DATA  
LINKS FOR SIMULTANEOUS DATA TRANSMISSION VIA A SINGLE DATA  
CHANNEL**

# METHOD FOR ASSIGNING A DATA CHANNEL TO MULTIPLE DATA LINKS FOR SIMULTANEOUS DATA TRANSMISSION VIA A SINGLE DATA CHANNEL

## 5 BACKGROUND OF THE INVENTION

The present invention relates generally to network communications and, more particularly, to selecting data channels to transmit data between different units of a network.

Modern motor vehicles typically have equipment such as a multimedia system. In addition to the traditional car radio, such multimedia systems can include a number of other units such as a  
10 cassette player, CD player, DVD player, television receiver, navigation system, screen, loudspeaker boxes, and a car telephone with hands-free equipment, to mention only a few examples. The commercially-available Media Oriented System Transport or Media Oriented Synchronous Transfer (MOST) network standard has been proposed to facilitate communications between equipment of a multimedia system implemented in motor vehicles such as cars, trucks, buses and the like. The  
15 multimedia equipment that can be linked together in such a network operate as data sources, data receivers and data transceivers. Data sources include, for example, car radios, CD players, video recorders, TV tuners, etc. Data sinks include, for example, an audio amplifier to which several loudspeakers are connected, and a display screen which displays an uncompressed video signal. A MOST network is commonly contemplated to be a ring network linking all units of the network to  
20 all other units. Generally, in addition to operating as data receivers or data sources, units of a MOST network can also operate as data transceivers, receiving and re-transmitting data on the network that is not addressed to the unit itself.

As the quantity of units linked to one another on a MOST network increases, so too does the demand for available data channels for transmitting data between the network units. However, there

is an inherent limitation in the quantity of available data channels of a MOST network. Conventionally, while a data channel is assigned to a connection segment between two communicating network units, the data channel is unavailable to support other communications on the network. As the quantity of assigned data channels increases, the quantity of remaining data channels decreases, ultimately adversely impacting the efficiency of the network communications.

Therefore, there is a need for a technique that increases the quantity of data channels that are available for data transmission in a MOST network.

## SUMMARY OF THE INVENTION

Briefly, according to an aspect of the invention, a method for data transmission via several data channels in a network linking several units to one another is disclosed. The units can function as data sources, data sinks or transceivers. The method includes assigning a first data channel to a first predetermined one or more connection segments; assigning the first channel to a second predetermined one or more connection segments not including the first predetermined one or more connection segments; and simultaneously transmitting data between two units across the first predetermined one or more connection segments via the first data channel, and between two or more other units across the second predetermined one or more connection segments via the first data channel.

Advantageously, the present invention eliminates the need to specify a data channel that is not currently used in the network to establish a new connection between two units of the network, as conventionally implemented. In contrast, a network implemented in accordance with the present

invention assigns to a new connection a data channel that is currently assigned to another connection.

Thus, in a network implementing the present invention, a data channel can have multiple assignments and occupations, resulting in optimal utilization of a limited number of data channels available on the network. This, in turn, provides for an optimized transmission capacity on the network without increasing the total number of data channels implemented in the network.

These and other objects, features and advantages of the present invention will become more apparent in light of the following detailed description of preferred embodiments thereof, as illustrated in the accompanying drawings.

## **BRIEF DESCRIPTION OF THE DRAWING**

FIG. 1 is a schematic diagram of a MOST ring network.

## **DETAILED DESCRIPTION OF THE INVENTION**

The present invention is directed to the efficient management of data channels in a network such as a network implementing the commercially-available Media Oriented System Transport or Media Oriented Synchronous Transfer (MOST) network standard. Generally, a network implemented in accordance with the present invention optimally utilizes the limited number of data channels available on the network by assigning to a new connection a data channel that is currently assigned to another connection. This results in data channels having multiple assignments and occupations, increasing the transmission capacity of the network without increasing the total number of implemented data channels.

The present invention will be described with reference to the MOST network 100 illustrated in FIG. 1. In this embodiment, there are ten network units 1-10 connected to a communication path 11 forming a ring network topology. The communication path 11 is formed of a plurality of connection segments 20-29 connecting adjacent network units 1-10 as illustrated in FIG. 1. For example, connection segment 20 connects network units 1 and 2; connection segment 21 connects network units 2 and 3, and so on. The present invention will now be described with reference to communications occurring over MOST network 100.

In this application, the MOST network 100 is implemented in a vehicle (not shown). In this example, the network unit 1 is a DVD player that transmits data to the network unit 4, which is a monitor situated in the rear of the vehicle. At the same time, network unit 6, which in this example is a DVD changer also situated in the trunk of the vehicle, transmits video data to network unit 9, which is a monitor situated in the dashboard of the vehicle.

The data transmitted from the DVD player 1, which in this example is operating as a data source, are received and re-transmitted ("looped through") network units 2 and 3, both of which operate as transceivers, and are received by monitor 4, which operates as a data sink. As is well known in the art, a data channel must be specified to establish a data link between the DVD player 1 and the monitor 4. In the embodiment illustrated in FIG. 1, the data channel assigned to this data transmission is data channel K1. The connection segment 20 connecting network units 1 and 2, the connection segment 21 connecting the network units 2 and 3, and the connection segment 22 connecting units 3 and 4, are allocated to data channel K1.

The data transmitted from DVD changer 6, which is operating as another data source, are

forwarded by network units 7 and 8, operating as transceivers, to the associated data sink, monitor 9. According to an aspect of the present invention, connection segments 25, 26 and 27, which lead from the DVD changer 6 to the monitor 9, are likewise allocated to the same data channel K1.

If needed, the still available connection segments 23, 24, 28 and 29 can also be allocated to data channel K1, if network units 4 and 9 act as data sources and units 5 or 6 and respectively 10 or 1 act as data sinks. This feature optimally uses the limited number of available data channels, thus optimizing the transmission capacity.

Preferably, the allocation of individual connection segments to data channels  $K_n$  is arbitrary, so that the connection segments can be advantageously allocated to data channels  $K_n$  in a manner that is optimally adapted to the prevailing transmission situation and operating condition. It is also preferable that data transmitted via a same data channel are transmitted in a same direction over the network 100. For example, as shown in FIG. 1, data is transmitted counterclockwise from the network unit 1 to the network unit 4, while data is transmitted counterclockwise from the network unit 6 to the network unit 9, both data transmissions occurring via data channel K1.

It should be understood, however, that the present invention is not limited to a particular network topology and that the illustrative ring network 100 is by way of example only. Nor is there any restriction with regard to transmission direction (e.g., only clockwise or counterclockwise). The present invention is suited to any network, regardless of its structure and given transmission direction. For example, in a ring network, data can be transmitted simultaneously clockwise and counterclockwise.

Although the present invention has been shown and described with respect to several

preferred embodiments thereof, various changes, omissions and additions to the form and detail thereof, may be made therein, without departing from the spirit and scope of the invention.

What is claimed is:

1. A method of determining a value of a function of a variable, the method comprising: receiving a value of the variable; and determining the value of the function of the variable based on the received value of the variable.